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ABSTRACT

This paper addresses the issue of how Harvard Project Zero's "teaching for understanding" might evolve over the next 100 years. Schools pitched to an Information Society seek ways of increasing the chances that learners will understand domains deeply and master the new basic skills. Such 21st century schools build upon Paulo Freire's assertion that education must empower learners to read the word and the world. Learners so empowered can make the world better. They can create sustainable solutions, solutions engaging complex problems and benefiting future generations. In these schools, clear instructional designs meet this more pregnant set of aims. Harvard University Project Zero research center has been developing the teaching for understanding (TFU) framework for 21st century schools. TFU is not the only new paradigm way of organizing thinking and learning for students from K to Ph.D.--rather it is one clear way, especially when the aim is deep disciplinary understanding. TFU fosters deep disciplinary understanding. The framework has added value when educators use it to empower learners. Along the way to best, worst, and probable scenarios about TFU, the paper looks at ideas about the current practice and the historical context enveloping the framework's evolution as a 21st century tool to educate all children for power and consequence. Lists 21 selections for further reading. (Contains 21 references.)(NKA)

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"Transcending stale and unproductive controversies, education for understanding puts the focus of education where it should be: on people's ever increasing grasp of the world."

Howard Gardner

"Melding traditional and progressive perspectives"

Teaching for understanding: Linking research with practice

TEACHING FOR UNDERSTANDING:

THE NEXT 100 YEARS

(An issue paper)

By Jerry Ellsworth Fluellen, Jr.
Philadelphia Writing Project
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Inside: **a deeper look at Harvard Project Zero's breakthrough—the teaching for understanding (TFU) framework. How might teaching for understanding evolve over the next 100 years? That is the issue explored. Along the way to best, worst, and probable scenarios about TFU, readers taste ideas about the current practice and the historical context enveloping the framework's evolution as a 21st century tool to educate all children for power and consequence.**

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Issue

How might teaching for understanding evolve over the next 100 years?

Abstract

Schools pitched to an Information Society seek ways of increasing the chances that learners will understand domains deeply and master the new basic skills (what John Naisbitt once called learning to learn, think and create).

Such 21st century schools build upon Paulo Freire's assertion that education must empower learners to read the word and the world. Learners so empowered can make the world better. They can create sustainable solutions, ones engaging complex problems and benefiting future generations. In these schools, clear instructional designs meet this more pregnant set of aims.

Harvard University Project Zero research center has been developing the teaching for understanding (TfU) framework for 21st century schools. TfU fosters deep disciplinary understanding. The framework has added value when educators use it to empower learners.

Executive Summary

With Spencer Foundation funding in the 1990s, researchers from Harvard University's Project Zero (PZ) and practitioners in the Cambridge area collaborated to co-construct the teaching for understanding (TfU) framework.

Howard Gardner and David Perkins, principal investigators, led the way along with Martha Stone Wiske who served as project manager.

By 1996, PZ offered 260 educators from around the world a summer symposium focused on their findings in the collaboration. Since then, educators have been gathering in the summer institutes to hear the latest ideas from the mouths of Howard Gardner, David Perkins and a team of PZ faculty.

At the turn of the millennium in year 2000, PZ offerings included the following:

- Summer institutes
- Online courses in teaching for understanding and multiple intelligences and support for practitioners in the field
- Books and articles by PZ authors and graduates of its summer institutes

Of concern in this paper, however, is the issue **how might teaching for understanding evolve over the next 100 years?**

Addressing this requires some background including a discussion of 3rd order change.

Background

My thinking about the evolution of Harvard's framework begins with a look at how we got here. This involves a thought experiment about the following: **what is 3rd order change?**

Some late 20th century views of change describe two levels: 1st order change and 2nd order change. For example, Watzlawick, Weakland, and Fisch describe 1st order change in the French proverb: "Plus ca change, plus c'est la meme chose." (The more things change, the more they stay the same.) Whereas, according to them, 2nd order change requires a change in the whole system. It is a change of change.

In a nutshell, 1st order change is characterized by changes in the parts with no change in the whole, the overall system. 2nd order change is a change in the whole with subsequent changes in the parts.

My favorite example of these types of change involves chess. There are dozens of classic and modern chess openings, each designed to exploit some idea in chess theory. The openings and their corresponding defenses seek to gain advantages in terms of center control, mobility, force and tempo. No matter what the openings and defenses the game stays the same.

Each opening or defense represents 1st order change—a change in parts with no subsequent changes in the whole. The game of chess remains intact.

But three-dimensional chess represents a fundamental shift in the whole game. The game is so complicated that openings and defenses that have been the mainstay of grand masters are meaningless. Big blue can not as yet be programmed to beat someone who plays 3-D chess well.

3-D chess represents 2nd order change. It is a change in the whole with corresponding changes in the parts. Beyond 2nd order change is a whole new game never before existing. To my knowledge, few explicit descriptions of this level of change exist in the literature on change processes or systems thinking.

Let's think it through, then, in a thought experiment.

3.5 million years ago early hominids functioned as hunters and gatherers. Hominids and, subsequently, early humans created a Hunting/gathering society. Hunter may have been the number one job and animals the number one resource.

10,000 years ago, at the end of the last Ice Age, people created civilizations and added farming to the mix of human preoccupations. The Agrarian Society, aided by the invention of the plow in Egypt had been born. Over a 10,000-year period more people may have held jobs as farmers than as hunters. Plants may have replaced animals as the number one resource.

150 years ago, more people began to manufacture goods for a living, particularly in Western nations such as the United States. Laborer became the number one job. There still were hunters and farmers, but the Industrial Society, aided by Taylor's scientific management, dominated. Oil became the number one resource.

According to John Naisbitt, author of Megatrends, in 1956, clerk became the number one job and the Information Society, aided by the invention of the computer, had emerged. There were more clerks than hunters, farmers, and laborers. Ideas may be the number one resource in such a society.

Each succeeding society encompassed the previous one, yet offered something new, something not seen before in human experience. What was new was a change in all macro systems: economics, schooling, science, spirituality, laws, government, health care, sports, transportation, communications, technology and the Arts.

If each macro system embodies 2nd order change, then a change in society represents 3rd order change—a transformation of patterns which connect the macro systems, resulting in the creation of emergent properties never before existing. Such change is meta-change. Such change is a paradigm shift.

While Thomas Kuhn coined the term "paradigm", Fritjof Capra gave the idea a deeper meaning. Kuhn's "paradigm" had been limited to a description of a revolution that takes place within a scientific community when the dominant view no longer can explain emerging scientific problems and a new view does a better job. For example, Einstein's theory of relativity explained phenomena untouched by Newtonian physics.

Capra extended the concept to describe a social change in thinking and values. His use of the word "paradigm" applies to a whole, a civilization. Thus, every 3rd order change is higher order change. A change in civilization is a change in its macro systems.

Take schooling as an illustration. In each society, schooling was one of the macro systems that changed holistically. Schooling in the Hunting/Gathering Society involved on the job training. Schooling in the Agrarian Society involved on the job training but apprenticeships in crafts and religions had become opportunities for a few. Schooling in the Industrial Society included on the job training and apprenticeships, but added public education for the masses. Basic literacy became more common. Advanced literacy had been the province of primarily elite white males.

Schooling in the Information Society included all that went before, but the elite class had been expanded to include females and selected minorities. Also, the 21st century definition of literacy had changed from reading, writing and arithmetic to problem posing and solving across the multiple intelligences and multiple disciplines. And the "basic skills", as John Naisbitt points out, had become learning to learn, think, and create.

In each society, a 3rd order change took place—a paradigm shift. The macro system called schooling changed holistically in accordance.

As Information Society schools emerge, the elite class may lose value because the majority of learners regardless of social class, race or ethnic origin would need deep disciplinary understanding—the new advanced literacy. They would be able to use any combination of Howard Gardner's multiple intelligences to create works of value across a range of disciplines. **But here in 2001, how many schools emphasize knowledge making and its requisite deep disciplinary understanding?**

Current practice

Presently, we are blessed to have several powerful instructional design theories to choose from. Charles Reigeluth's recent text *(Instructional design theories and models: A new paradigm of instructional theory)* presents almost two dozen theories for readers to compare. Among them is Harvard University Project Zero research center's teaching for understanding framework.

TfU, then, is not the only new paradigm way of organizing thinking and learning for students from K to Ph.D. Rather, it is one clear way, especially when the aim is deep disciplinary understanding.

Perhaps, the most lucid presentation of the framework to date is Tina Blythe's *Teaching for understanding guidebook.* This text includes David Perkins' chapter that explores a performance view of understanding. Says Perkins, "...understanding is being able to carry out a variety of actions or 'performances' that show one's grasp of a topic and at the same time advance it."

He adds, "It is being able to take knowledge and use it in new ways."

"Performances of understanding must take students beyond what they already know."

TfU organizes curriculum and instruction in such a way that learners "...spend the larger part of their time with activities that ask them to do thought provoking tasks such as explaining, making generalizations, and ultimately, applying their understanding on their own. And they must do these things in thoughtful ways, with appropriate feedback to help them do better."

Five dimensions characterize the Project Zero (PZ) framework, according to Blythe:

- **Generative topic**
- **Throughlines**
- **Understanding goals**
- **Understanding performances**
- **Ongoing assessments**

Blythe says a generative topic is "central to one or more disciplines."

"They are interesting to students. They are accessible to students."

She asserts that a generative topic should offer multiple connections in and out of school, and it "should form the core of the curriculum."

In the case of teachers bound to institutional standards, the generative topic might be a theme for one or more disciplines in the curriculum.

Blythe says understanding goals focus the generative topic and, thus, make it more manageable. While the understanding goals are often "unit-sized...there are also year-long or overarching goals, sometimes called 'throughlines.'"

Throughlines, in Blythe's view, "...describe the understandings that you feel are most important for students to take away from your class."

Generative topic, throughlines, and understanding goals become visible in the understanding performances.

Says Blythe, "performances of understanding need to be linked closely to understanding goals. Students should be engaged in performances that demonstrate and develop understanding from the beginning to the end of the unit or course."

Last, in contrast to the widespread practice of assessing student works at the end of a unit or course, Blythe says ongoing assessments are key to the development of deep understanding of domains.

"Instances of assessment", she argues, "might involve feedback from the teacher, from peers, or from self-evaluations."

"Sometimes the teacher may provide assessment criteria, and sometimes he or she may engage students in developing them."

Then Blythe concludes, "while there are many reasonable approaches to ongoing assessment, these factors are constant: public criteria, regular feedback, and frequent reflection throughout the learning process."

In the hands of a teacher faced with a huge number of topics in a curriculum framework such as the one in Philadelphia, TfU serves as tool for making sense of an abundance of information. It permits uncovering instead of covering—depth of disciplinary understanding instead of a Hirsch-like command of trivia. A sample multidisciplinary project for a 5th grade helps to imagine how TfU might work with real kids in a real classroom.

Generative topic

The Human Story: From Hominids to Homo Intelligens

This generative topic seems to meet Blythe's criteria:

Central to one or more domains

Interesting to students (and the teacher)

Offers opportunities to make connections in and out of school

Throughlines

1. What makes us human?
2. How might humans evolve?
3. How might we practice a few critical human values:
   - We are all one.
   - We always are impeccable with our words.
   - We always are practicing TLC (thinking, learning, and creating).
   - We always do our best.
   - We always seek truth, beauty, and goodness.

These are three overarching themes for a multidisciplinary project. They are to be posted in the classroom and referred to throughout the course the way an actor might use throughlines in a play to develop a character.

Understanding Goals

1. Learners will understand how humans evolved from hominids.
2. Learners will understand how to create five closely related works: a personal narrative, an information piece, a science fiction story, a persuasive essay, an "I search" paper, and a set of best, worst, and probable scenarios. These will become entries in each learner's electronic portfolio.
3. Learners will understand how to practice the five critical human values as everyday classroom rules.

These understanding goals focus the generative topic and make it more manageable.

Understanding Performances

1. Learners will make regular classroom and whole school presentations across the intelligences (Howard Gardner's MI theory and David Perkins' science of learnable intelligence) as well as practice ways of involving audiences in their presentations. (See Jerry Fluellen's ethnographic study of children in a TfU class.)

2. Learners will assess created works about human evolution with a public rubric based on the Gardner and Boix-Mansilla idea about four types of understanding.

3. Learners will fashion at least five intellectual products about human evolution (a personal narrative, an imaginative story, an informational essay, a persuasive essay, and a research paper documented in MLA style). As enrichment, they may also write scenarios to imagine human evolution over the next 10,000 years.

4. Learners will keep processfolios of their works in progress and electronic portfolios (hard drive or web site) of selected benchmark works.

These understanding performances give learners a lot of chances to both show what they know and build new understandings.

Ongoing Assessments

Two performance definitions of understanding guide the ongoing assessment of works from learners.

1. "Understanding is the transfer of knowledge to a situation for which that knowledge is appropriate." (Howard Gardner)

2. "Understanding a topic is a matter of being able to think and act creatively and competently with what one knows about the topic." (David Perkins and Chris Unger)

These performance definitions of understanding guide the selection or development of a public rubric—one used by the facilitator, students, parents, and other stakeholders to assess the quality of works with an eye on showing what one knows and building new understanding.

For example, the Gardner and Boix-Mansilla rubric for disciplinary understanding suggests four types of learning in its description. If it were used in the human story project work would be assessed for the following:

knowledge about human evolution

methods scientists use to create knowledge about human evolution

purposes for the knowledge of human evolution

forms in which scientists might share the knowledge about human evolution

Additionally, assessments become observations of each chi'd's multiple intelligences profile, performances of understanding, documents, and finally best works in a portfolio (hard copy or electronic).

In all, "The human story..." answers the four basic questions Martha Stone Wiske asks teachers to consider when thinking about curriculum and instruction:

What topics are worth understanding?

What about these topics needs to be understood?

How can we foster understanding?

How can we tell what students understand?

Taproots of TfU

David Perkins describes constructivism in his article for the November 1999 thematic issue of *Educational Leadership.* Says Perkins, "although most constructivist classrooms feature active, social, and creative learning, different kinds of knowledge invite different constructivist responses, not one standard constructivist approach."

Each educator's use of Harvard's teaching for understanding framework has a unique application, yet it is characterized by an emphasis on active, social and creative teaching and learning in a variety of classroom situations.

Perkins extends this view further. He says "constructivism generally cast learners in an active role. Instead of just listening, reading, and working through routine exercises, they discuss, debate, hypothesize, investigate, and take viewpoints..." This is active learning.

"Constructivists often emphasize that knowledge and understanding are highly social. We do not construct individually; we construct then in dialogue with others." This is social learning.

Finally, Perkins adds, "Often constructivists hold that learners need to create or recreate knowledge for themselves." This is creative learning.

In short, an instructional-design theory such as TfU goes beyond the fact-driven Information Society and aims at the Knowledge Society to come sometime in the next 100 years.

TfU demands that learners engage "understanding performances" which learners then assess with a public rubric. Such engagement is at once active, social, and creative.

According to Perkins, "research shows that the best way to remember a body of information is to organize it actively, looking for internal patterns and relating it to what you already know."

A TfU thematic unit such as "The Human Story: From Hominids to Homo Intelligens" encourages learners to organize knowledge actively, socially, and creatively. Learners invent patterns and relate the patterns to prior knowledge. This may be a nonlinear process and spiral of understanding, deepening and extending ad infinitum.

Any TfU unit calls to mind a Chinese proverb.

I hear and I forget.

I see and I remember.

I do and I understand.

But still the issue remains: how might TfU evolve over the next 100 years.

Scenarios: TfU—the next 100 years

So far, this issue paper has put TfU into the context of an instructional-design theory that aims at deep disciplinary understanding, not only as a hallmark of an educated person living in the 21st century, as Gardner argues in his recent book *Disciplined Minds,* but as a way of pointing learners to the emerging Knowledge Society. Also, I have set TfU in the context of constructivism, its taproots.

TfU puts learners to work in a community that constructs knowledge through active, social, and creative processes. It does not separate members of the community into teacher and student, bright and less bright, more elite and less elite, or old and young. Rather it allows for each learner to develop his or her multiple intelligences and mindfulness in a dialogue group—what the late 20th century scientist David Bohm called a community in which the free exchange of thought could take place, especially the entertainment of opposing views.

When the evolution of TfU over the next 100 years is considered, a puzzle emerges. There is no philosophical bent such as constructivism to give clues because of the likelihood that the future will disconnect with the past. Predicting the future is an uncertain enterprise.

Laura Lee cites tasty reminders of predictions gone wrong in an article for a recent issue of *The Futurist.*

"I predict the Internet...will go spectacularly supernova and in 1996, catastrophically collapse." Bob Metcafe, InfoWorld, 1995

"Louis Pasteur's theory of germs is ridiculous fiction." Pierre Pachet, professor of physiology, 1872

" 'The concept is interesting and well-formed, but in order to earn better than a "C", the idea must be feasible.' A Yale University management professor in response to student Fred Smith's paper proposing reliable overnight delivery service. Smith went on to found Federal Express."

"There is [sic] not enough troops in the army to force the Southern people to break down segregation and admit the Negro race into our theaters, into our swimming pools, and into our churches." Senator Strom Thurmond, 1948

"Houses will be able to fly [by 2000]...The time may come when whole communities may migrate south in the winter, or move to new lands whenever they feel the need for a change of scenery." Arthur C. Clark, *Vogue* 1966.

Add to these the certain doom called Y2K. It never happened.

Faced with such puzzles as thinking about tomorrow, futurists often replace outright predictions with scenarios. Scenarios tell stories of possibilities with the humility of accepted uncertainty. All the scenarios could be wrong and still benefit thinkers because they present contrasting views and encourage imagining new alternative views. They add value to nonlinear thinking.

Futurists, thus, can imagine the possible in terms of best, worst, and probable scenarios to provide at least three dimensions or perspectives. For each best, worst, and probable scenario another could have been considered.

For me, thinking about the issue how might TfU evolve over the next 100 years from multiple perspectives increases mindfulness of its present strengths and shortcomings.

Best scenario

TfU gained widespread use in our nation's schools and around the world as the need for people who could create sustainable solutions to complex problems increased. Complex problems such as terrorism, health threats from global warming, and long term consequences of the human genome project required deep disciplinary understanding as a requisite to the kind of interdisciplinary knowledge needed to create nonlinear solutions that did not diminish the chances of future generations.

By the close of 21st century, the practice of teaching for understanding had found its way into the minds of ordinary teachers making up the folk pedagogy. Widespread was the belief that all children could understand disciplines deeply. Thinking and learning, then, was attached to performance assessments across the multiple intelligences and big ideas such as understanding human evolution, the human genome project, space colonization, third order models for dealing with 21st century racism, effects of global warming and its solutions, the fundamental role of cognition in the evolution of life on Earth, and the Gaia hypothesis.

Widespread was the acceptance of Howard Gardner's early, 21st century definition of intelligence. Wrote Gardner, "I offer a more refined definition. I now conceptualize intelligence as a biopsychological potential to process information that can be activated in a cultural setting to solve problems or create products that are of value in a culture."

Intelligence, indeed, had become the number one resource of the Knowledge Society forming the historical context of early 22nd century life. That brought to mind Frank Herbert's idea in Chapterhouse Dune, the final book of his Dune saga.

"Education is no substitute for intelligence. That elusive quality is defined only in part by puzzle-solving ability. It is in the creation of new puzzles reflecting what your senses report that you round out the definition."

Worst scenario

TfU continued to flourish in isolated communities of the nation. But stubborn habits of mind from the 20th century persisted. Racism, sexism, ageism, and shallow ecology still prevented new paradigm thinking from gaining power with people. Bent instead on power over people, politicians and policymakers aimed at maintaining divisions among people and creating linear solutions to complex problems. They saw good schools in terms of class size, vouchers, charters, and books. They saw psychometric measures of school success as the only valid assessment of progress. They saw intelligence as reified into a score and attached life shaping decisions about students based on numbers.

Believers in Hirsch swelled decision-making positions and effectively blocked efforts to teach for deep disciplinary understanding. Yet a few elite situations made sure that its learners had what Vito Perrone once called an "education for power and consequence."

As a result, the gap between economically and/or racially privileged people continued to grow exponentially even as the school aged population grew to 93 million in the United States by the 22nd century.

Probable scenario

TfU followed a 20th century law of innovation. As the 21st century closed, 70% of the schools in our nation and many around the world used TfU as a main stay in helping learners to understand disciplines deeply. It was well suited for combining with other powerful instructional-design theories such as Howard Gardner's MI approach or Charles Reigeluth's Elaboration theory and it invited use of appropriate technology for learning.

A few schools, about 13%, considered TfU but adopted one of the many other quality instructional-design theories available at a growing number of universities in the nation. A few schools, about 13%, taught basic skills such as reading, writing and arithmetic.

Even fewer schools, about 2%, used Meta instructional-designs such as Jerry Fluellen's "Intelligences Squared." Educators in these schools wove content standards, theoretical frameworks, and visions of human potential into a whole that was not only greater than the sum of its parts but emergent property that was beyond the capability of its parts, namely **frontal lobe power.**

Thus, these schools sought to educate for power and consequence by the mindful development of each child's multiple intelligences profile. In terms of frontal lobe power, these schools sought to increase each person's capacity to imagine possibilities unbounded by space and time.

And then about 2% of the schools relied on instruction rooted in behaviorism. There was, after all, still a Flat Earth Society in England, alive and active in the 22nd century.

The very success of TfU served to snuff the development of an even more appropriate instructional-design theory for a Knowledge Society, namely, the teaching for knowledge-making (TfKM) framework.

And far on the outskirts of 22nd century life, the Spiritual Society had been emerging. This new society would draw from cross disciplinary ideas first proposed by thinkers over 100 years before: Paulo Freire, Frijof Capra, Howard Gardner, Martin Luther King, Jr., Ellen Langer, Neale Donald Walsch, Hazel Henderson, Maharishi Mahesh Yogi, Brother Roger, David Bohm and many others. They had each given cloth for a society that sewed science and spirit into a patchwork quilt.

Final Thought

Beyond Harvard's teaching for understanding framework, our life in the early 21st century may seem pivotal to future historians. As Stuart Brand argues, civilization began 10,000 years ago at the end of the last Ice Age. He says a longer now means thinking of 10,000 years in the past and 10,000 years in the future. Thus, we are not just at the turn of a new millennium. Rather we are at the dawn of a new 10,000 years.

This is the age when the Newtonian paradigm that dominated the Information Society in the United States gives way to Capra's ecological paradigm or Bohm's holographic paradigm. This is the age when computers extended the frontal lobe power of human beings and wove us into one, huge global brain. This is the age when telecommunications extended our language to travel in synchronous time at the speed of light and asynchronous time in digital space. This is the age when robotics and rockets extended our finger dexterity to the depths of the seas and the reaches of the Milky Way. This is the age when Homo Sapiens show signs of evolving into Homo Intelligens.

And we have been using only 10% of our brainpower. What happens when we use more?

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